

WHAT IS CLAIMED:

1 Claim 1. Apparatus for effecting the closure of an open
2 end of a carton blank which includes a heat sealing component,
3 following the partial infolding of portions of the end side
4 walls of the blank into at least partial overlying relationship
5 to one another comprising,

6 a cam having a rear face and a camming face, said camming
7 face including a plurality of camming surfaces which vary in
8 geometry, said camming surfaces including at least a convex
9 radiussed camming surface which transitions into a concave
10 radiussed camming surface, said transition occurring along an
11 imaginary line drawn at an angle of 6 degrees from the vertical
12 and wherein each of said radiussed surfaces is tangent to said
13 imaginary line and to each other,

14 said cam being mounted for linear movement relative to the
15 partially infolded portions of the end side walls of the carton
16 blank.

1 Claim 2. The apparatus of Claim 1 and including a cam
2 follower and a support arm, said support arm having a distal end
3 and a proximal end mounted for pivotal movement of said support
4 arm, said cam follower being mounted on said distal end of said
5 support arm and disposed adjacent to and in operative
6 relationship to said camming face of said cam.

1 Claim 3. The apparatus of Claim 2 and including a
2 piston/cylinder subassembly disposed adjacent said distal end of
3 said support arm and having the piston rod thereof in operative
4 engagement with said distal end of said support arm such that
5 extension of said piston rod effects movement of said cam
6 follower along said camming face of said cam and sequentially
7 over multiple ones of said plurality of camming surfaces.

1 Claim 4. The apparatus of Claim 3 wherein said piston rod
2 is reciprocative along a path which is aligned substantially
3 perpendicular with respect to said linear movement of said cam.

1 Claim 5. The apparatus of Claim 3 wherein said cam
2 follower comprises a roller.

1 Claim 6. The apparatus of Claim 1 wherein said plurality
2 of camming surfaces of said cam include a straight first surface
3 portion which transitions into a straight second portion which
4 angles downwardly at an angle of about 45° from the horizontal,
5 which transitions into a convex radiussed third surface portion,
6 which transitions into a fourth concave radiussed surface
7 portion, which transitions into a straight fifth surface.

1 Claim 7. The apparatus of Claim 1 wherein approximately
2 the first 36% of the total pivotal movement of the roller cam
3 follower during a single pressing cycle occurs during a first
4 time period during which the rate of linear travel of the cam is
5 greatest for said pressing cycle thereby maximizing the linear
6 travel of the cam while simultaneously minimizing the energy
7 employed to effect the movement of the roller cam follower.

1 Claim 8. Apparatus for effecting the closure of an open
2 end of a carton blank which includes a heat sealing component,
3 following the partial infolding of portions of the end side
4 walls of the blank into at least partial overlying relationship
5 to one another comprising

6 a cam mounted for reciprocative linear movement toward and
7 away from the partially infolded end side wall portions, said
8 cam having a camming surface,

9 a support arm having distal and proximal ends, said
10 proximal end being mounted for pivotal movement of said distal
11 end of said arm along a path which is substantially
12 perpendicular to the direction of linear reciprocation of said

13 cam,

14 a cam follower mounted on said distal end of said support
15 arm and disposed in operative juxtaposition to said camming
16 surface of said cam whereby pivotal movement of said support arm
17 moves said cam follower along said camming surface of said cam
18 and effects corresponding linear movement of said cam,

19 a pressure pad mounted for linear movement with said cam
20 and disposed in juxtaposition to the infolded end side wall
21 portions of the carton blank.

1 Claim 9. The apparatus of Claim 8 and including a mandrel
2 receiving the carton blank thereover, a backup pad disposed on
3 said mandrel and underlying said infolded end side wall portions
4 of the carton blank, whereby the infolded end side wall portions
5 of the carton blank are captured and pressed together between
6 said backup pad and said pressure pad upon linear movement of
7 said cam toward said backup pad.

1 Claim 10. The apparatus of Claim 9 and including a
2 plurality of camming surfaces defined on said cam face of said
3 cam, said camming surfaces being sequentially disposed along
4 said cam face for sequential engagement therewith by said cam
5 follower upon pivotal movement of said cam follower.

1 Claim 11. The apparatus of Claim 10 wherein said plurality
2 of camming surfaces includes a camming surface having a convex
3 radiussed geometry extending over a portion of said camming
4 face, and a further camming surface having a concave radiussed
5 geometry extending over a further and contiguous portion of said
6 camming face, said convex radiussed camming surface
7 transitioning into said concave radiussed camming surface along
8 an imaginary line drawn tangent to said transition between said
9 camming surfaces and said radiussed camming surfaces are tangent
10 to one another at said transition.

1 Claim 12. A method for the closure of an open end of a
2 carton blank including a heat-sealable component, wherein the
3 end side walls adjacent the open end of the carton are heated to
4 at least their heat-sealing temperature and initially infolded
5 to partially close the open end of the carton, comprising the
6 steps of

7 capturing the heated and initially infolded end side walls
8 of the carton between a rigidly mounted backup pad disposed
9 within the interior of the carton blank and a pressure pad
10 disposed externally of the carton blank and mounted for
11 reciprocative movement toward and away from said backup mandrel,

12 disposing a linearly reciprocative cam in operative
13 relationship to said pressure pad to apply pressure to said pad
14 upon linear movement of said cam toward said pressure pad,

15 providing on said cam a camming face disposed opposite said
16 pressure pad,

17 providing a cam follower disposed adjacent to and in
18 operative relationship to said camming surface,

19 applying a force against said cam follower in a direction
20 substantially perpendicular to the direction of linear movement
21 of said cam to thereby move said cam and said pressure pad
22 toward said backup pad by a distance sufficient to press the
23 infolded end side wall portions of the carton blank into
24 intimate overlying relationship to one another, and

25 maintaining said pressure applied to said infolded end side
26 wall portions for a time sufficient to effect solidification and
27 sealing of said infolded end side wall portions to one another
28 and thereby close the end of the carton blank.

1 Claim 13. The method of Claim 12 and including the step of
2 operatively connecting said cam follower to the piston rod of a

3 piston/cylinder subassembly whereby extension of said piston rod
4 effects pivotal movement of said cam follower.

1 Claim 14. The method of Claim 12 and including the step of
2 providing a plurality of camming surfaces which collectively
3 define said camming face of said cam.

1 Claim 15. The method of Claim 14 wherein said plurality of
2 camming surfaces includes a camming surface having a convex
3 radiussed geometry extending over a portion of said camming
4 face, and a further camming surface having a concave radiussed
5 geometry extending over a further and contiguous portion of said
6 camming face, said convex radiussed camming surface
7 transitioning into said concave radiussed camming surface along
8 an imaginary line drawn tangent to said transition between said
9 camming surfaces and said radiussed camming surfaces are tangent
10 to one another at said transition.

1 Claim 16. The method of Claim 14 wherein said plurality of
2 camming surfaces of said cam includes a straight first surface
3 portion which transitions into a straight second portion which
4 angles downwardly at an angle of about 45° from the horizontal,
5 which transitions into a convex radiussed third surface portion,
6 which transitions into a fourth concave radiussed surface
7 portion, which transitions into a straight fifth surface.